SPECIAL AIRWORTHINESS INFORMATION BULLETIN

Aircraft Certification Service
Washington, DC

U.S. Department of Transportation

Federal Aviation Administration

CE-05-72
July 18, 2005

http://www.faa.gov/aircraft/safety/alerts/

This is information only. Recommendations aren't mandatory.

Introduction

This Special Airworthiness Information Bulletin (SAIB) alerts you, owners and operators of **all T-6 models, AT-6 models, SNJ models, and Harvard Mark models of airplanes** (including non-U.S. type certificated airplanes operating under an experimental airworthiness certificate), of airworthiness information.

We determined that an unsafe condition existed in these airplanes and an emergency airworthiness directive (AD) against the models included on a U.S. type certificate.

This SAIB provides additional background that was not in the AD and alerts owners and operators of other aircraft that are not specified in the AD of an airworthiness concern.

Why did we issue emergency AD 2005-12-51?

A Rockwell International Model SNJ-6 (AT-6F) airplane crashed on May 9, 2005, resulting in two fatalities. The ensuing investigation revealed a large fatigue crack in the failed right-hand (R/H) lower inboard wing attach angle (also known as the tank attachment angle), which resulted in the loss of the wing in flight. The fatigue crack was several inches in length. Although the National Transportation Safety Board (NTSB) report is not final, initial reports indicate that the crack growth occurred over a long period of time. The wing attachment angle on the accident aircraft did not appear to be corroded or to have any other defect or damage. The aircraft was used for hire in aerobatic training and was not used in aerial combat operation. The maneuvers performed were from an aerobatic syllabus developed from the list of allowed military maneuvers for the airplane. Because the crack appeared to be caused by normal fatigue wearout, we issued Emergency AD 2005-12-51 to prevent another similar accident in the fleet.

Are the Harvard Mark II, III, and IV's and others covered by this AD?

As listed on the AD, the AD applies to the following models:

- ROCKWELL INTERNATIONAL (Aircraft Specification No. A-2-575 previously held by NORTH AMERICAN and recently purchased by BOEING) Models AT-6 (SNJ-2), AT-6A (SNJ-3), AT-6B, AT-6C (SNJ-4), AT-6D (SNJ-5), AT-6F (SNJ-6), BC-1A, SNJ-7, and T-6G airplanes.
- AUTAIR LTD. (Aircraft Specification No. AR-11 previously held by NOORDUYN AVIATION LTD.) Model Harvard (Army AT-16) airplanes.

The only Harvard model listed in the AD is the "basic" Harvard (Army AT-16). The other Harvard models, which were manufactured in Canada, are not covered by this AD because these models are not approved under a U.S.

type certificate. These models are also not eligible for a Standard Category Airworthiness Certificate.

On June 10, 2005, the government of Canada issued Canadian AD CF-2005-19, which includes the airplanes on the U.S. AD and adds the Hawker Siddley Canada Limited (Canadian Car) Harvard Models 2 and 4 included on Canadian Type Certificate A-80. You can get this AD at: **http://www.tc.gc.ca/CivilAviation/certification/menu.htm**. The Canadian Harvard models hold experimental airworthiness certificates in the United States.

The Harvard models have identical wing structure as the T-6 and SNJ models. The airworthiness concern applies to these models as well. We recommend that the AD inspections be done on all like models. For the inspections done on a Harvard model, we request that you complete the Inspection Report from Figure 1 of AD 2005-12-51 and return it per the instructions.

What have we found from the inspection of the fleet so far?

As of July 12, 2005, about 300 owners and operators (about half of the fleet) have submitted reports regarding the inspection of the attach angles. This includes 12 reports of cracks, corrosion, or damage found. Two reports were of cracks similar to the accident airplane, which, if left unrepaired, could lead to wing failure. The average age of the fleet is over 6,000 hours. Over half of the fleet currently reports aerobatic operations.

Does this AD apply to airplanes that do not have a standard airworthiness certificate, but are included on the U.S. type certificate?

The AD applies to those airplanes listed in the AD regardless of the airworthiness certificate. Some airplanes of the listed models may now carry an experimental exhibition airworthiness certificate. The AD applies also to those airplanes.

What does the AD require?

This AD requires immediate and repetitive inspections of the inboard and outboard, upper and lower wing attach angles (except for the nose angles) of both wings for fatigue cracks; and, if any crack is found, replacement of the cracked angle with a new angle.

The AD specifies the following actions:

(i) Initially inspect before further flight after receipt of the emergency AD, unless previously done within the last 15 hours time-in-service (TIS).

(ii) Repetitively inspect thereafter every 200 hours TIS.

(iii) Replace angles as necessary prior to further flight after the inspection where cracks are found.

(iv) Report to us the results of the initial inspection even if no damage is found and even if the inspection was previously done.

Detailed instructions regarding the inspection procedures and reporting requirements are in the AD.

Do I need to be a qualified fluorescent penetrant inspector to perform this AD?

No. We believe that any aircraft mechanic holding a current FAA license is qualified to perform this inspection. However, if you are not familiar with fluorescent penetrant inspections you should make the effort to become as familiar with the process and adhere to the fluorescent penetrant manufacturers instructions.

Why does the inspection have to be done every 200 hours time-in-service (TIS)?

The 200-hour TIS interval was taken directly from service instructions developed by the South African Air Force (SAAF):

LMU 81 titled “Servicing Instructions/SAAF/Harvard/43A Mainplane and Centre Section Bolting Angle – Parting Of.” In 1975, a wing detached from a Harvard airplane operated by the SAAF. According to a

former North American employee, at that time, an FAA-approved repair station in South Africa worked directly with North American and the SAAF to create the service instructions for the inspection of the wing attachment angles. Those instructions contained a 200-hour repetitive inspection interval. From the original version of the document in 1975 until the latest revision to that document, dated June 30, 1995, the 200-hour TIS inspection interval remained. The SAAF inspected its fleet using the 200-hour TIS interval until it retired the airplanes in 1996. We consider this document to be equivalent to service information from the manufacturer or TC holder. We have a 20-year success history with the SAAF. We are working with the SAAF to learn more about the 1975 accident and the results of the inspections that they did until 1996.

Since continued operation will cause existing fatigue cracks to grow and new cracks to form, repetitive inspections provide the safety net needed to detect cracks that may have grown to a detectable size between inspections. We will raise the interval if a substantiated crack growth analysis or fleet experience indicates that crack growth is slow enough to allow longer intervals.

Why does the AD prohibit use of a red dye penetrant inspection?

We have determined that red dye penetrant inspection method is not the preferred method for reliably finding small cracks. The red dye inspection method is not as sensitive as fluorescent penetrant inspection (FPI), and the application of the developer material is much more critical to achieving good results with the red dye than with FPI. If red dye penetrant is used on a part with small cracks and those cracks are not detected, subsequent FPI inspection may not work. The red dye will "fill" the crack and not allow the FPI solution to penetrate the crack. Non-destructive inspection (NDI) reference documents no longer recommend the use of red dye for aviation applications.

Can I use alodine or just a corrosion inhibiting fluid instead of paint to protect against corrosion between inspections?

The instructions in the AD are specific to use paint to protect against corrosion. Several coats of alodine may be used and will prevent against corrosion in the near term, but we do not recommend it since it is porous and corrosion is more likely than if you use paint. The AD requires paint because it is unknown how much calendar time will elapse between inspections. Since corrosion is an issue on this airplane, more protection is better. You may decide to use one of the approved eddy current inspections for future inspections. One advantage of these eddy current inspections is that they do not require paint removal.

What if I found a fatigue crack but I am hesitant to report it to you?

We included the reporting requirement in the AD to obtain data on the fleet to help assess the severity of the problem. We have already received reports of angles with cracks or severe corrosion. Accurate data will help us justify any adjustments to the inspection procedures or interval. Sporadic reporting of data may not be accurate and of little value. This puts a burden on the owners to justify inspection internal adjustments. We would like to thank all those who have responded and would like to encourage those who have not to please respond.

What if I find corrosion or damage, but not a fatigue crack on the attach angles?

It is likely that you will need to replace the attach angle if you find corrosion or significant damage (such as deep nicks, scratches, or gouges). In order to return an airplane with significant corrosion or damage to service, you will need to remove the corrosion or damage, which constitutes a repair. Since this angle is the subject of an AD, the repair must be FAA-approved. At this time, we do not know how much damage the angles can withstand, and it is necessary to develop an engineering analysis to determine if the damage is beyond limits

and will lead to a premature fatigue crack. Since this engineering data takes time and resources to develop, most people choose instead to replace the angle.

This does not mean that no repair or damage is acceptable. We understand that many of the attach angles have small nicks and gouges from usage or from removal and installation of the wing attach bolts. This small damage is considered minor and may be left in place or blended out. However, you should be careful of any damage in the center angles on the lower side of the wing. These are the most highly loaded angles and where the failure occurred on the accident airplane. You should consider any damage in these angles that is not purely cosmetic major.

The bolt torques specified in the AD appear low. Is this a mistake?

No. The bolt torques were taken from the South African Air Force bulletin LMU 81. These torques are within the range of torques allowed by the repair manuals for the T-6 models and were used for over 25 years by the SAAF after their inspections. As a reminder, you should note the drag of the lock nut and add to the AD torque values to apply the correct torque to the bolts.

The AD does not specifically mention to install washers when reinstalling the bolts. Do I need to install washers?

Yes. You should reinstall all parts as required in the maintenance manual.

If the attach angles have recently been replaced, can I obtain an exemption from the AD requirements?

At this time, all attach angles must be inspected regardless of how long they have been in service. We recognize that newly replaced angles are much less likely to develop a crack. We will consider approving an alternative method of compliance (AMOC) to modify the inspection requirements on a case-by-case basis.

If you replace these parts, use appropriate new (unused) parts that are inspected as airworthy. As per our maintenance requirements, you should record the flight hours TIS when removed or installed. You may install previously used parts that have been inspected and considered airworthy on other aircraft. However, since the bolt attachment pattern is unique to each individual aircraft, it is not likely that a part from one wing will fit another wing.

If I fly nonaerobatic gentle maneuvers, why does this AD apply to me?

All of these aircraft are at least 50 years old and were flown as military trainers so they have all likely been flown in aerobatic operation. Even though you may currently fly low stress maneuvers on the airplane, fatigue damage from previous operations still exists in the wing attach angles. Since we do not know how gentle of a maneuver you must fly to do no further fatigue damage, we must assume that all flying will do some fatigue damage, and, that even gentle flying, will eventually wear the part out. Due to this cumulative nature of fatigue wearout, the initial and repetitive inspections apply to all airplanes.

Are there other inspection procedures that can reliably detect these cracks?

Yes. We have approved several eddy current inspection procedures as AMOC to the AD inspection procedures per paragraph (g) of the AD. Any interested party may develop specific eddy current instructions based upon their equipment and experience and apply for an AMOC to the AD.

Eddy current inspections have been approved as AMOCs to the AD for the following companies:

- NDT Inspect-Air, Inc, Franksville, Wisconsin; phone: (262) 878-8700
- Tailwind Inspection, Inc, Tulsa Oklahoma; phone: (918) 832-5210
- Rogers NDT, Inc. Spring, Texas; phone: (281) 794-0947

- NDE Services, Inc., Greenwood Village, Colorado; phone: (303) 741-0518

NOTE: If you are interested in using one of these AMOCs, we suggest that you contact the holders of the AMOC.

Are there other AMOCs beside those for eddy current inspection?

Yes. We have approved the use of smaller diameter locking nuts of equal strength so it is easier to torque the wing attachment bolts. There are reports that clearance between the nut and wing fasteners may be a problem, especially in the top attachment angles, since the upstanding leg is shorter and the bolts are closer to the wing. Blackhawk Aircraft Maintenance LLC, Janesville, Wisconsin, holds this AMOC.

As an alternative to changing the type of nuts, we suggest following this reattachment sequence. Since the wing develops a positive dihedral at the attach angle, install the top surface attach bolts with the nuts facing inboard and the lower surface attach bolts with the nuts facing outboard. This should allow easier access to the nuts with a torque wrench and a long extension. Some mechanics have created a special socket by grinding it thinner to allow access to the difficult to access nuts.

Should I be looking at the other structure on my airplane that may also be experiencing the effects of aging?

Yes. We have issued several ADs to address a variety of unsafe conditions. We suggest that extra attention be placed on compliance with these ADs, especially those that address corrosion. Given the vintage and the often little known usage history of the airplanes, they are especially susceptible to corrosion. The airplane should be inspected in an extensive and methodical manner and not limited to the areas affected by the AD. Corrosion in a 60-year-old structure may manifest itself in areas generally considered to be less susceptible to corrosion in airplanes of more recent manufacture.

Could you provide a list of all ADs that apply to the various models of affected airplanes?

Models AT-6, AT-6A, AT-6B, AT-6C:	
AD Number	**AD Subject**
2005-12-51	Upper and lower wing attach angles
50-38-01	Fuselage Structure Corrosion
50-09-01	Stabilizer Spar Fittings and Shims
49-07-02	Fuel System Placard
46-46-02	Elevator Stop
46-17-01	Flap Control Universal Joint Pins
46-11-01	Landing Gear Retracting Strut
Models AT-6D, AT-6F:	
2005-12-51	Upper and lower wing attach angles
81-14-10	Vertical and Horizontal Stabilizers
50-38-01	Fuselage Structure Corrosion
Model BC-1A:	
2005-12-51	Upper and lower wing attach angles
50-09-01	Stabilizer Spar Fittings and Shims
49-07-02	Fuel System Placard
46-46-02	Elevator Stop
46-17-01	Flap Control Universal Joint Pins
46-11-01	Landing Gear Retracting Strut
Model T-6G:	
2005-12-51	Upper and lower wing attach angles
81-14-10	Vertical and Horizontal Stabilizers

Are we considering further mandatory airworthiness action on these airplanes?

Yes. During the course of the investigation we have received several other inspection bulletins from the South African Air Force for inspections, and from operators in England requiring inspection. We have also heard reports of other areas that may need to be addressed by operators. One particular concern is to develop an inspection of the propeller governor. Since several operators have

reported that the counterbalance has detached, which causes destructive vibration if not acted upon immediately. Barring any other accidents, we intend to work with the owners, operators, and type clubs to develop reasonable further action.

NOTE: There may also be ADs issued against the engines, propellers, and appliances utilized on these airplanes.

This SAIB is for information only. It does not prevent us from initiating additional rulemaking action in the future if the situation so dictates.

For Further Information Contact

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Additional Information

You may access the docket for AD 2005-12-51 at:

- http://dms.dot.gov/search/searchResultsSimple.cfm. The Docket No. is FAA-2005-21463. Enter 21463 in the search block.

- http://www.airweb.faa.gov/Regulatory_and_Guidance_Library/rgAD.nsf/MainFrame?OpenFrameSet. Enter 2005-12-51 in the search block.

You may access Canadian AD CF-2005-19 at**:**

- http://www.tc.gc.ca/CivilAviation/certification/menu.htm. Click on Airworthiness Directives and then enter CF-2005-19 in the search block.